Fisheries Management and Evaluation for 2006 Willamette River Spring Chinook

Oregon Department of Fish and Wildlife
Ocean Salmon and Columbia River Program
Columbia River Management

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Introduction

In February 2001, the Oregon Department of Fish and Wildlife (ODFW) submitted a Fisheries Management and Evaluation Plan (FMEP) for upper Willamette River spring Chinook salmon to the National Marine Fisheries Service (NMFS) under limit number 4 of the 4(d) Rule for the upper Willamette River (ODFW 2001). Upper Willamette River wild spring Chinook salmon were listed as a threatened species under the federal Endangered Species Act (ESA) in May 1999.

The NMFS evaluated ODFW's FMEP and determined the FMEP adequately addressed all of the criteria specified in limit number 4 of the 4(d) Rule. Thus, take prohibitions under Section 9 of the ESA and applicable 4(d) Rule do not apply to fishery harvest activities, provided such fisheries are managed in accordance with the FMEP.

The FMEP requires all freshwater harvest fisheries for Willamette spring Chinook to be selective for hatchery fish. Willamette hatchery spring Chinook have been mass-marked with an adipose fin clip beginning with the 1997 brood. Based on hatchery release records, about 99.9% of the age 4-5 hatchery spring Chinook returning in 2006 were adipose fin-clipped (97% in 2005, 98% in 2004). The FMEP limits the total fishery impact on Willamette wild spring Chinook to an annual average rate of 15% or less in combined freshwater fisheries. This fishery impact rate limit ensures the survival and rebuilding of wild populations.

The FMEP indicates ODFW will complete an annual report that includes a summary of the previous year's run, fisheries, spawning escapement, fishery mortality estimates, and fishing plans for the coming year. The report is due to NMFS January 31 of each year.

2006 Willamette Spring Chinook Run

The 2006 Willamette spring Chinook return was 59,662 fish to the mouth of the Columbia River. This was 14,000 fish less than the 1970-2006 average run of 73,700 fish, and was the second consecutive decline from high runs during 2001-2004 (Table 1 and Figure 1).

The 2006 preseason forecast developed by ODFW was for a return of 46,500 fish entering the Columbia River, which was similar to the 1995-1999 average return of 42,400. The wild portion of the 2006 run was estimated preseason at 10% or 4,700 fish (Melcher 2005). Forecasts have generally under-predicted when runs were increasing and over-predicted when runs were decreasing (Figure 2).

The primary basins that support natural production of spring Chinook are the Clackamas, North Santiam, and McKenzie rivers, and the McKenzie is considered to be the most important of these. The Clackamas, North Santiam, and McKenzie rivers were sampled for wild fish escapement in 2006, but dam counts at the Upper and Lower Bennett dams on the North Santiam were discontinued in 2006 due to lack of funding. Angler creel surveys were not conducted in the North Santiam and McKenzie rivers; therefore, 2006 harvest information must be based on angler harvest card returns, which are not currently available. Harvest estimates from angler

harvest cards do not include estimates of released fish, which precludes their use in directly estimating impacts to wild fish. Estimates of fishery impacts to wild runs are based upon average hatchery encounter rates in recent years, and assumed release mortality of 12.2% (Lindsay et al. 2003) for wild fish caught and released in fisheries. Because much of the information needed to accurately reconstruct total wild fish escapement for 2006 are inexact or unavailable, escapement and impact estimates in this report are similarly inexact.

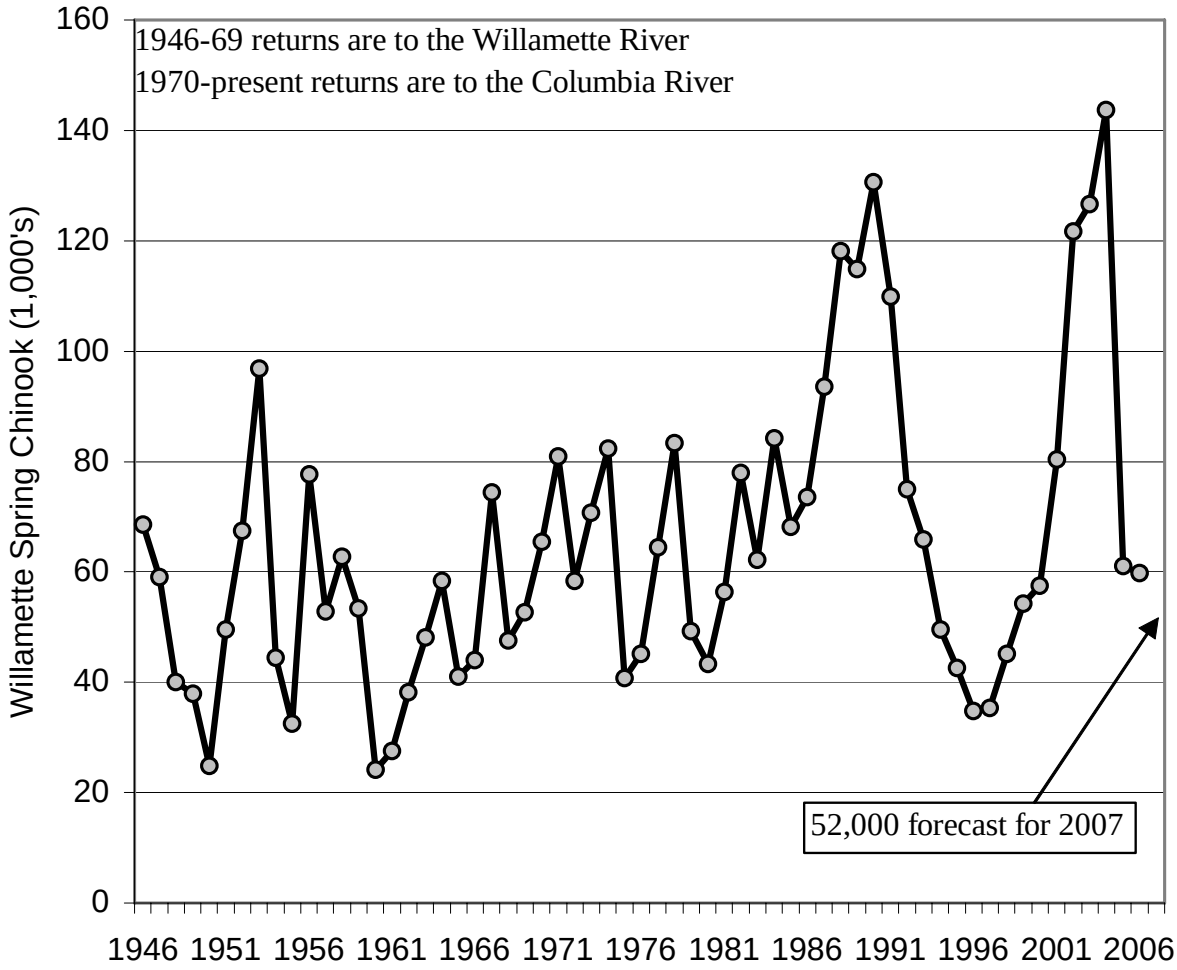

Figure 1. Historic Willamette spring Chinook returns 1946-2006, and 2007 forecast.

Table 1. Willamette River spring Chinook returns and lower Willamette recreational harvest, 1946-2006.

Year	Run Entering Columbia	Run Entering Willamette [1]	Falls Count	Mortalities Below Falls [2]	Run Entering Clackamas R.	Lower Willamette Recreational Fishery					
						L. Willamette Recreational Catch [3]	Days Fished [4]	Catch Per Trip	Harvest Rate	Wild Fish Impact	Trips Per Fish
1946		68,600	53,000		3,000	12,600	61,900	0.20	18%		4.9
1947		59,000	45,000		2,000	12,000	91,900	0.13	20%		7.7
1948		40,100	30,000		1,800	8,300	83,600	0.10	21%		10.1
1949		37,900	27,000		1,800	9,100	85,500	0.11	24%		9.4
1950		24,800	14,500		1,500	8,800	73,400	0.12	35%		8.3
1951		49,600	34,300		2,000	13,300	92,600	0.14	27%		7.0
1952		67,500	52,200		2,800	12,500	91,100	0.14	19%		7.3
1953		96,800	76,400		4,000	16,400	102,800	0.16	17%		6.3
1954		44,400	31,100		1,800	11,500	104,100	0.11	26%		9.1
1955		32,500	22,000		1,500	9,000	77,700	0.12	28%		8.6
1956		77,600	58,600		3,000	16,000	84,100	0.19	21%		5.3
1957		52,800	39,300		2,000	11,500	95,500	0.12	22%		8.3
1958		62,800	45,200		2,100	15,500	137,900	0.11	25%		8.9
1959		53,400	31,900		3,000	18,500	134,100	0.14	35%		7.2
1960		24,200	14,400		1,800	8,000	92,300	0.09	33%		11.5
1961		27,500	18,900		2,200	6,400	75,100	0.09	23%		11.7
1962		38,200	26,000	100	3,000	9,100	74,000	0.12	24%		8.1
1963		48,100	30,300	200	4,000	13,600	84,800	0.16	28%		6.2
1964		58,400	36,300		3,500	18,600	118,700	0.16	32%		6.4
1965		41,100	29,100		3,000	9,000	74,000	0.12	22%		8.2
1966		44,000	28,200		3,000	12,800	85,700	0.15	29%		6.7
1967		74,400	56,200		3,000	15,200	92,500	0.16	20%		6.1
1968		47,500	31,500	500	2,000	13,500	91,800	0.15	28%		6.8
1969		52,600	33,700	100	2,500	16,300	99,000	0.16	31%		6.1
1970	65,500	53,500	34,200		1,500	17,700	118,800	0.15	33%		6.7
1971	80,900	67,400	44,600	600	2,200	20,000	112,800	0.18	30%		5.6
1972	58,400	47,100	26,200	200	2,200	18,500	91,200	0.20	39%		4.9
1973	70,700	54,500	42,000	300	2,200	10,000	90,300	0.11	18%		9.0
1974	82,400	71,800	44,500	100	2,200	25,000	154,000	0.16	35%		6.2
1975	40,800	32,800	19,100	100	1,100	12,500	143,800	0.09	38%		11.5
1976	45,100	40,800	22,100	100	2,200	16,400	149,100	0.11	40%		9.1
1977	64,400	58,100	40,000	100	4,000	14,000	126,400	0.11	24%		9.0
1978	83,330	71,400	47,500	100	4,000	19,800	157,600	0.13	28%		8.0
1979	49,200	44,600	26,600	100	5,000	12,800	132,700	0.10	29%		10.4
1980	43,300	42,400	27,000		8,500	7,000	83,600	0.08	17%		11.9
1981	56,300	48,600	30,100		8,000	10,500	124,300	0.08	22%		11.8
1982	78,000	72,500	46,200	100	7,300	18,900	142,900	0.13	26%		7.6
1983	62,200	55,100	30,600	300	10,400	13,800	136,100	0.10	25%		9.9
1984	84,200	74,500	43,500	400	11,300	19,400	136,900	0.14	26%		7.1
1985	68,100	57,100	34,500	400	6,600	15,500	185,600	0.08	27%		12.0
1986	73,600	62,500	39,200	400	7,900	15,000	171,900	0.09	24%		11.5
1987	93,600	82,900	54,800	500	8,700	18,800	173,500	0.11	23%		9.2
1988	118,100	104,000	70,500	200	8,700	24,600	209,700	0.12	24%		8.5
1989	114,900	102,000	69,200	200	8,400	24,200	186,200	0.13	24%		7.7
1990	130,600	106,300	71,300	600	11,500	23,000	200,400	0.11	22%		8.7
1991	109,900	95,300	52,500	400	11,900	30,500	235,800	0.13	32%		7.7
1992	75,000	68,000	42,000	1,000	11,500	13,500	188,500	0.07	20%		14.0
1993	65,900	63,900	32,000	400	10,800	20,700	174,100	0.12	32%		8.4
1994	49,600	47,200	26,100	1,400	7,500	11,500	155,700	0.07	24%		13.5
1995	42,600	42,500	20,600	600	6,600	14,700	145,300	0.10	35%		9.9
1996	34,800	34,600	21,600	1,100	5,900	6,100	63,800	0.10	18%		10.5
1997	35,300	35,000	26,900	400	5,800	1,900	15,000	0.13	5%		7.9
1998	45,100	45,000	34,500	300	7,400	2,800	34,500	0.08	6%		12.3
1999	54,200	53,900	40,400	600	7,400	5,500	45,400	0.12	10%		8.3
2000	57,500	56,100	39,100	300	7,700	11,400 [5]	76,100	0.15	16%	14.0%	6.7
2001	80,400	73,000	54,000	600	10,800	12,400 [6]	101,500	0.12	10%	2.1%	8.2
2002	121,700	109,000	83,100	600	14,400	13,600 [7]	89,400	0.15	10%	3.0%	6.6
2003	126,600	117,600	87,700	700	15,400	16,200 [8]	91,400	0.14	10%	2.4%	5.6
2004	143,700	130,500	96,000	500	21,900	14,600 [9]	110,800	0.13	11%	2.7%	7.6
2005	61,000	55,900	36,600	700	12,700	7,500 [10]	78,700	0.07	9%	3.2%	14.1
2006	59,700	54,900	37,000	300	10,400	8,700 [11]	75,600	0.09	12%	4.2%	10.8

[1] Tribal fishermen harvested 759, 29, and 12 Chinook at Willamette Falls in 1994, 1995, and 1996 respectively.

[2] Number of mortalities below Willamette Falls includes predation by sea lions. For 1997, 1998, 1999, 2000, 2001, 2002, and 2003, the estimated sea lion take was 141, 150, 348, 138, 70, 143, and 143 respectively.

[3] Catch totals include estimates for the mainstem Willamette bank fishery in 1947, and 1951-2001. Clackamas catch is included from 1950-70 and Eagle Creek catch is included from 1962-70. Clackamas River catch averaged 100 to 200 fish for these years.

[4] No estimate for number of days fished was made for the L. Willamette bank fishery of 1946-74.

[5] Total catch of 11,382 includes 8,712 kept, and 2,670 released. Hook and release mortality estimate is 299.

[6] Total catch of 12,362 includes 6,969 kept, and 5,393 released. Hook and release mortality estimate is 706.
[7] Total catch of 13,635 includes 10,457 kept, and 3,178 released. Wild fish hook and release mortality estimate is 369.
[8] Total catch of 16,200 includes 13,146 kept, and 3,054 released. Wild fish hook and release mortality estimate is 373.
[9] Total catch of 14,600 includes 11,639 kept, and 2,919 released. Wild fish hook and release mortality estimate is 327.
[10] Total catch of 7,500 includes 5,572 kept, and 1,893 released. Wild fish hook and release mortality estimate is 231.
[11] Total catch of 8,700 includes 7,027 kept and 1,648 released. Wild fish hook and release mortality estimate is 203.

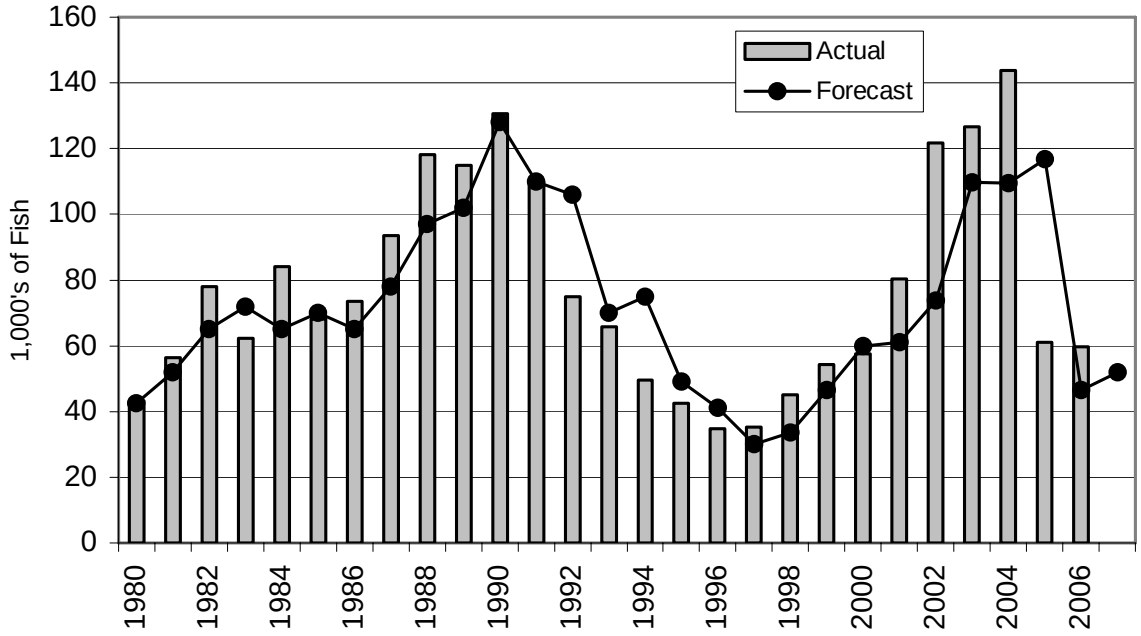

Figure 2. Predicted and observed Willamette spring Chinook returns to the Columbia River, 1980-2006. Predicted only for 2007.

Columbia River Return

The return to the Columbia River mouth in 2006 was 59,662 fish (Table 2). The return was comprised of the following age classes:

	No.	%
Age 3	351	0.6
Age 4	41,912	70.2
Age 5	15,975	26.8
Age 6	1,424	2.4
Total	59,662	

Clackamas River Return

The return to the Clackamas River in 2006 was 10,425 fish (Table 2). The return was comprised of the following age classes:

	No.	%
Age 3	80	0.8
Age 4	7,697	73.8
Age 5	2,485	23.8
Age 6	163	1.6
Total	10,425	

The return to North Fork Dam on the Clackamas River in 2006 was 2,137 fish (Table 3 and Figure 3). Sampling by Portland General Electric staff showed the return to be 1,088 (51%) adult hatchery fish and 1,049 adult unmarked fish. Adipose fin-clipped fish were not allowed to pass the dam to reach natural spawning areas. Most of the 1,100 hatchery fish were recycled downstream to pass upstream again through the recreational fishery. Although many were hauled two and three times, some seven or eight times, few were caught in the fishery. Based on a preliminary run reconstruction (Table 4), the wild return entering the Clackamas River in 2006 was about 13% (1,333 fish) of the 10,425 run entering the Clackamas River (Table 5).

An escapement of 1,049 unmarked fish at North Fork Dam is less than the full seeding goal of 2,900 fish contained in the Clackamas River Basin Fish Management Plan for Spring Chinook (ODFW 1998).

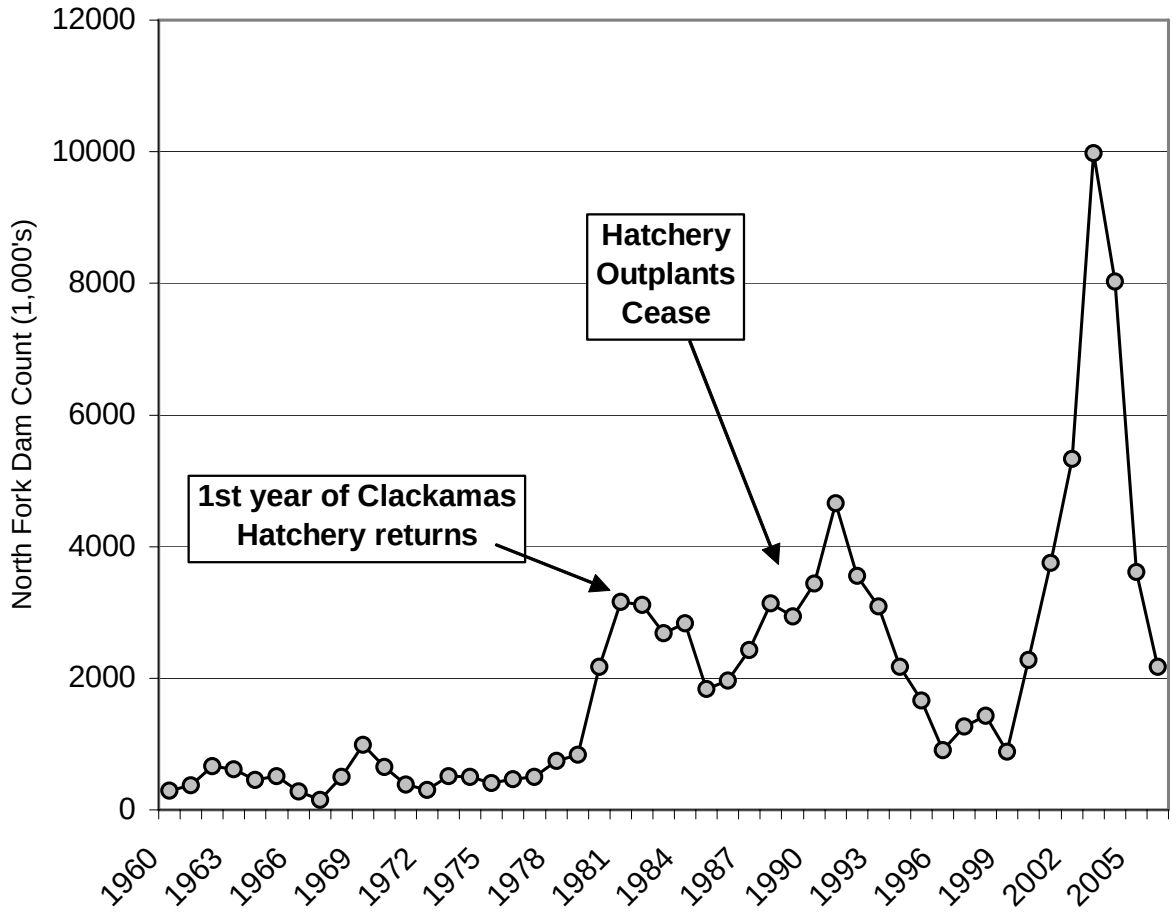

Figure 3. Spring Chinook returns to North Fork Dam (Clackamas River), 1960-2006.

Table 2. 2006 Willamette Spring Chinook Return.

Catch	Age 3	Age 4	Age 5	Age 6	Total
LCR Commercial (landed catch)	11	844	1,117	125	2,097
LCR Commercial (rel. mortality)	1	134	163	20	318
SAFE Commercial (landed catch)	0	103	168	0	271
LCR Recreational (kept catch)	6	1,018	903	57	1,984
LCR Recreational (rel. mortality)	0	18	16	1	35
L. Will. Recreational Fishery (kept catch)	60	5,057	1,744	166	7,027
L. Will. Recreational Fishery (rel. mortality)[1]	2	146	50	5	203
Will. Falls Indian Fishery	0	0	0	0	0
Lower Clackamas Recreational (kept catch)	0	313	72	12	397
Lower Clackamas Recreational (rel. mortality)[1]	0	11	3	0	14
Totals	80	7,644	4,236	386	12,346
Escapement					
Willamette Falls Count	190	26,751	9,224	876	37,041
Mortality Below Falls	0	58	75	8	141
Clackamas Hatchery Return	43	5,253	1,924	67	7,287
Eagle Creek Hatchery Return[2]	3	2	1	0	6
North Fork Dam, Passed Upstream	32	827	189	33	1,081
North Fork Dam, Recycled Downstream	2	857	197	34	1,090
Natural Spawn Bel. N.F. Dam[3]	0	434	99	17	550
Sea Lion Predation[3]	1	86	30	3	120
Totals	271	34,268	11,739	1,038	47,316
Run Entering Columbia	351	41,912	15,975	1,424	59,662
Percent	0.6%	70.2%	26.8%	2.4%	
Run Entering Willamette	333	39,813	13,624	1,222	54,992
Percent	0.6%	72.4%	24.8%	2.2%	
Run Entering Clackamas	80	7,697	2,485	163	10,425
Percent	0.8%	73.8%	23.8%	1.6%	

[1] Release mortality from Lindsay et. al. 2003 (12.2% of released fish)
[2] USFWS Estimate of fish returning to Eagle Creek Hatchery. Fish do not enter hatchery.
[3] Average of most recent five year period

Table 3. 1998-2006 Spring Chinook Returns (adults only) to North Fork Dam, Clackamas River, Oregon.

Year	Unclipped/ Wild[1]	Clipped/ Hatchery[1]	Total Adults
1998	588	0	588
1999	849	7	856
2000	1,928	200	2,128
2001	2,365	1,302	3,667
2002	2,170	3,566	5,736
2003	3,364	6,116	9,480
2004	5,176	7,854	13,030
2005	2,882	2,925	5,807
2006	1,049	1,088	2,137

[1] Prior to implementation of full mark-selective fisheries, less than 100% of hatchery fish were marked. Therefore, 1998-2002 Unclipped/Wild numbers do not necessarily reflect only wild fish.

Table 4. Run reconstruction for wild and hatchery spring Chinook (adults only), and fishery impacts to wild run, Clackamas River, 2002-2006.

	Wild				Hatchery							
	Dam Count	Nat. Spawn	Rel. Mort.	Total	Dam Count	Nat. Spawn	Hatchery Harvest	Hatchery Returns	Total	Total Run	%Wild	Wild Impact
2002	2,170	19	140	2,329	3,566	31	2,565	6,274	12,436	14,765	16%	0.060
2003	3,364	177	38	3,579	6,116	323	1,345	3,543	11,327	14,906	24%	0.011
2004	5,176	397	31	5,604	7,854	603	1,340	6,570	16,367	21,971	26%	0.006
2005	2,882	355	38	3,275	2,925	361	1,240	4,797	9,323	12,598	26%	0.012
2006	1,049	270	14	1,333	1,088	280	397	7,293	9,058	10,390	13%	0.011

Table 5. Estimated return of spring Chinook to the Clackamas River, 1979-2006.

	L. Clackamas Recreational Catch		North Fork Dam Count (adults)		Natural Spawn	Hatchery Return		
Year	Kept	Released (est. mort.)	Passed	Not Passed	Below N.F. Dam	Eagle Ck. NFH	Clackamas	Total Return
1979	1,226		838		159	2,803	0	5,026
1980	3,165		2,172		624	1,480	1,024	8,465
1981	2,334		3,162		654	812	1,065	8,027
1982	2,463		3,119		203	905	573	7,263
1983	4,532		2,685		770	522	1,923	10,432
1984	4,300		2,835		600	1,032	2,521	11,288
1985	2,478		1,834		635	726	944	6,617
1986	3,900		1,960		600	661	776	7,897
1987	3,186		2,425		868	1,338	1,005	8,822
1988	2,720		3,140		201	1,373	1,253	8,687
1989	2,900		2,938		600	1,137	865	8,440
1990	4,710		3,444		600	869	1,847	11,470
1991	3,834		4,659		500	88	2,776	11,857
1992	2,697		3,553		750	0	4,535	11,535
1993	2,963		3,090		200	0	4,635	10,888
1994	1,541		2,174		100	9	3,675	7,499
1995	1,708		1,659		150	19	3,112	6,648
1996	1,869		903		100	2	3,044	5,918
1997	1,732		1,267		150	0	2,670	5,819
1998	1,302		1,431		100	4	4,530	7,367
1999	1,890		878		100	4	4,562	7,444
2000	1,179		2,277		20	9	4,296	7,781
2001	78	544 (61)	3,748		50	3	6,155	10,095
2002	2,565	1,145 (140)	2,170	3,566	50	18	6,256	14,765
2003	1,345	315 (38)	3,364	6,116	500[1/]	11	3,532	14,906
2004	1,340	277 (31)	5,176	7,854	1,000	300	6,270	21,971
2005	1,240	311 (38)	2,882	2,925	716	250	4,547	12,598
2006	397	115 (14)	1,049	1,088	550	6	7,287	10,390

[1/] *Staff estimates only 140 may have spawned; the remainder were prespawning mortalities.*

North Santiam River Return

The 2004-2005 North Santiam spring Chinook returns were monitored at Upper and Lower Bennett dams by ODFW staff (Table 6). Due to funding shortages, the 2006 run was not monitored at these locations. Nearly all hatchery fish returning in 2004-2006 were adipose fin-clipped. All hatchery fish were also thermally otolith marked prior to release (Schroeder et al., 2002). An estimated 13,531 and 4,883 adult spring Chinook passed Bennett dams in 2004 and 2005, respectively. A total of 1,510 (11.1%) fish in 2004 and 924 (18.9%) fish in 2005 were not adipose-fin-clipped. Otoliths were collected from unclipped carcasses during spawning ground

surveys upstream of the dams. Readings for 2006 are not complete yet, but in 2005, 28% of unclipped Chinook recovered in the North Santiam above the dams had hatchery otolith marks. Applying this ratio to unclipped Chinook observed in 2005 gives an adjusted estimate of 667 (14%) naturally-produced Chinook in 2005.

Redd counts of spring Chinook salmon in the North Santiam River were near the ten-year average in 2004 and 2005, and slightly lower than the ten-year average in 2006 (Table 7). Redd counts in the Little North Fork Santiam, showed a similar relationship to the ten-year average in 2004-2006.

Based on a preliminary run reconstruction (Table 8) using: a four-year average for wild fish at Bennett Dams for 2002-2005 (450 fish) as a surrogate for the missing 2006 count, estimated natural spawn of wild fish below the dams in 2006, and estimated fishery impacts for 2006, the mainstem North Fork Santiam wild run in 2006 was estimated at 464 fish.

Table 6. Adult spring Chinook counts at Bennett dams, adjusted for non-clipped hatchery returns, 2001-2006.

	Adult Dam Count			% Non-clipped carcasses with thermal marks	Estimated Adults		Adjusted Percent Wild
Year	Non-clipped	Clipped	Total		Wild	Hatchery	
2001	388	6,398	6,786	43.4	220	6,566	3
2002	1,233	6,407	7,640	51.0	604	7,036	8
2003	1,262	11,570	12,832	78.5	271	12,561	2
2004	1,510	12,021	13,531	67.6	489	13,042	4
2005	924	3,959	4,883	27.8	667	4,216	14
2006	--	--	--	--	--	--	--

Table 7. Redd counts of spring Chinook salmon in the North Santiam River, 1997-2006.

	Redd Counts									
Area	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Mainstem North Santiam: Stayton to Minto	134	155	215	272	308	276	630	283	240	202
Little North Fork of the Santiam	10	39	11	22	18	30	31	51	61	34
Total	144	194	226	294	326	306	661	334	301	236

Table 8. Run reconstruction for wild and hatchery spring Chinook, and fishery impacts to wild run, North Fork Santiam River, 2002-2006.

	Wild Run				Hatchery Run						
	Dam Count	Nat. Spawn	Rel. Mort.	Total	Dam Count	Nat. Spawn	Harvest	Total	Total Run	Wild %	Wild Impact
2002	604	32	28	664	7,036	80	3,969	11,085	11,749	6%	0.042
2003	271	7	9	288	1,2561	64	4,837	17,462	17,750	2%	0.033
2004	489	17	8	514	1,3042	53	2,108	15,203	15,717	3%	0.016
2005	665	7	8	680	4,217	25	487	4,729	5,409	13%	0.012
2006	450[1]	8	6	464	4,217[1]	31	487[1]	4,735	5,199	9%	0.012

[1] *Dam counts and angler harvest card data are unavailable for 2006. Values are calculated as: Wild count = average of 2002-2005 counts; Hatchery dam count = 2005 count; Hatchery harvest = 2005 harvest.*

McKenzie River Returns

The minimum 2006 return to the McKenzie River was 7,477 fish (Figure 4 and Table 9). The majority of McKenzie hatchery spring Chinook returning in 2006 were adipose fin-clipped. The 2006 Leaburg Dam count was comprised of 2,225 non-adipose-fin-clipped fish and 945 adipose-fin-clipped hatchery fish (Table 10). This is a minimum estimate, as fish ladder video counts are incomplete at this time. The preliminary unmarked fish escapement of 2,225 fish above Leaburg Dam is less than the escapement goal range of 3,000-5,000 in the McKenzie River Basin Fish Management Plan for Spring Chinook (ODFW 1998). Based on preliminary run reconstructions (Table 11), an estimated 2,392 of the 2006 run were wild fish (35%).

Table 9. Estimated return of spring Chinook to the McKenzie River, 1970-2006.
(Estimated total return will not match Table 11 due to differences in calculations of natural spawning below Leaburg Dam.)

Run Year	Leaburg Dam Count	McKenzie Hatchery Return	Recreational Catch: Above Leaburg Dam	Recreational Catch: Below Leaburg Dam	Recreational Catch: Total	Est. Natural Spawn Below Leaburg Dam: Redds	Est. Natural Spawn Below Leaburg Dam: No. Fish[1/]	Total Return
1970	2,991	20	--	--	525	278	1,251	4,787
1971	3,602	232	--	--	621	415	1,868	6,323
1972	1,547	301	--	--	1,125	177	797	3,770
1973	3,870	56	--	--	1,510	556	2,502	7,938
1974	3,717	0	--	--	1,022	689	3,101	7,840
1975	1,374	0	--	--	461	346	1,557	3,392
1976	1,899	396	--	--	139	409	1,841	4,275
1977	2,714	1,517	--	--	1,071	850	3,825	9,127
1978	3,058	1,464	--	--	924	599	2,696	8,142
1979	1,219	798	--	--	303	155	698	3,018
1980	1,980	807	--	--	381	219	986	4,154
1981	1,078	784	--	--	493	282	1,269	3,624
1982	2,241	1,460	--	--	627	241	1,085	5,413
1983	1,561	821	15	206	221	172	774	3,377
1984	1,000	1,901	51	567	618	271	1,220	4,739
1985	825	1,923	8	459	467	381	1,715	4,930
1986	2,061	1,705	29	354	383	315	1,418	5,567
1987	3,455	1,593	29	1,339	1,368	212	954	7,370
1988	6,753	2,487	86	1,133	1,219	484	2,178	12,637
1989	3,981	3,154	134	1,730	1,864	228	1,026	10,025
1990	7,226	3,206	315	1,387	1,702	160	720	12,854
1991	4,359	4,483	64	1,922	1,986	161	725	11,553
1992	3,816	3,407	81	1,195	1,276	106	477	8,976
1993	3,629	2,051	80	1,761	1,841	142	639	8,160
1994	1,526	701	13	486	499	59	266	2,992
1995	1,622	1,135	24	84	108 [2/]	66	297	3,162
1996	1,445	1,573	58	244	302 [2/]	71	320	3,640
1997	1,176	1,524	0	0	0 [3/]	90	405	3,105
1998	1,874	1,690	0	0	0 [3/]	95	428	3,992
1999	1,909	2,279	0	0	0 [3/]	82	369	4,557
2000	2,657	3,553	0	0	0 [3/]	132	594	6,804
2001	4,428	3,920	4	576	580 [3/]	100	450	9,378
2002	6,087 [4/]	6,832	26	2,243	2,269 [3/]	115	518	15,706
2003	9,327 [5/]	6,171	8	1,573	1,581 [3/]	171	770	17,849
2004	9,043	4,752	23	3,035	3,058 [3/]	99	446	17,299
2005	3,108	3,199	37	616	653 [3/]	75	338	7,298
2006	3,170	3,026	--	--	957 [6/]	72	324	7,477
1970-06 Average	3,171	2,025	45	911	906 [6/]	245	1,104	7,232
1994-06 Average	3,644	3,104	9	727	499 [6/]	94	425	8,124

[1/] *Estimated Natural Spawn below Leaburg Dam = No. of Redds below Leaburg Dam X 4.5 Fish/Redd.*
[2/] *Adipose fin-clipped hatchery fish only allowed to be retained.*
[3/] *Closed season.*
[4/] *An additional 690 adipose fin-clipped hatchery fish were removed from Leaburg Dam ladder and hauled and released primarily above Cougar Dam into the South Fork McKenzie River.*
[5/] *An additional 1,197 adipose fin-clipped hatchery fish were removed from Leaburg Dam ladder and hauled and released primarily above Cougar Dam into the South Fork McKenzie River.*
[6/] *Estimated from mean harvest rate from 2002-2004. 2005-2006 values are not included in 1970-06 and 1994-06 harvest averages.*

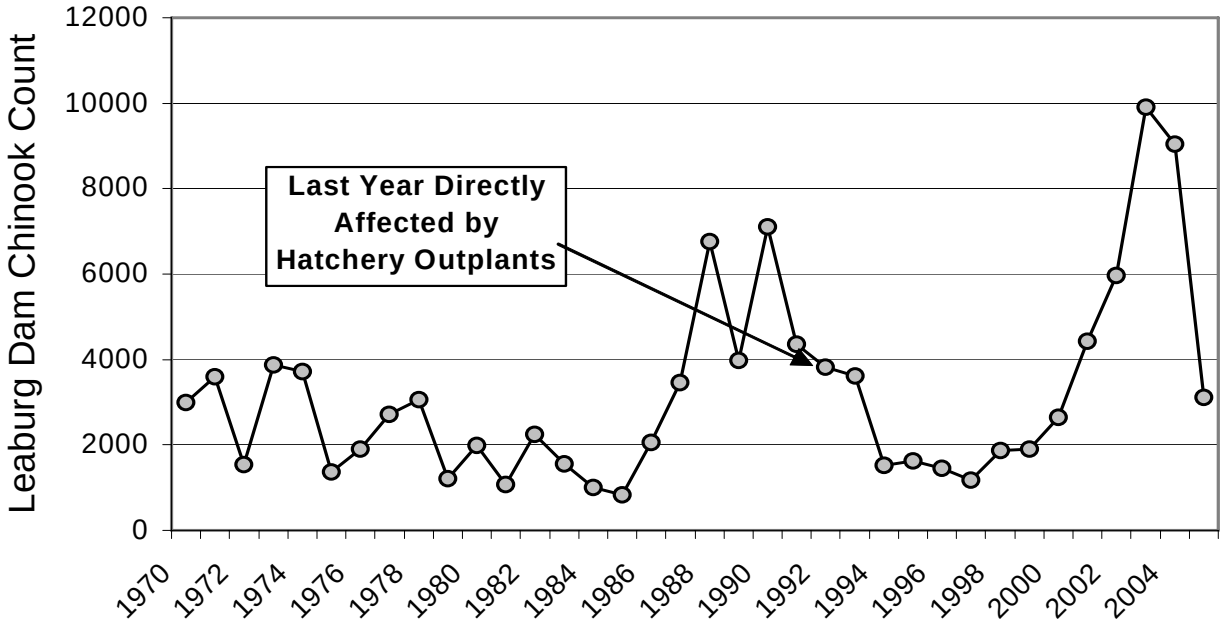

Figure 4. Spring Chinook returns to Leaburg Dam (McKenzie River), 1970-2006.

Table 10. Spring Chinook counts at Leaburg Dam on the McKenzie River, 1994-2006.

	Wild		Hatchery		
Year	Number	Percent	Number	Percent	Total
1994	825	54	701	46	1,526
1995	933	58	689	42	1,622
1996	1,105	76	340	24	1,445
1997	991	84	185	16	1,176
1998	1,415	76	459	24	1,874
1999	1,383	72	526	28	1,909
2000	1,985	75	672	25	2,657
2001	3,435	80	862	20	4,297
2002	4,223 [1/]	69	1,864	31	6,087 [2/]
2003	5,837 [1/]	62	3,576	38	9,413 [3/]
2004	4,799	53	4,253	47	9,052
2005	2,586	82	562	18	3,148
2006	2,225 [4/]	70	945 [4/]	30	3,170 [4/]

[1/] *Includes a preliminary estimate of 18% non-adipose-fin-clipped fish that were found to have otolith marks indicating they were reared in a hatchery.*

[2/] *An additional 690 adipose fin-clipped hatchery fish were removed from Leaburg Dam ladder.*

[3/] *An additional 1,197 adipose fin-clipped hatchery fish were removed from Leaburg Dam ladder.*

[4/] *2006 counts are preliminary through October 25, 2006 only. Counts for the remainder of 2006 will be contingent on funding for review of fish ladder video recordings.*

Table 11. Run reconstruction for wild and hatchery spring Chinook, and fishery impacts to wild run, McKenzie River, 2002-2006.
(Estimated total return will not match Table 9 due to differences in calculations of natural spawning below Leaburg Dam.)

	Wild Run				Hatchery Run							
	Dam Count	Nat. Spawn	Rel. Mort.	Total	Dam Count	Nat. Spawn	Harvest	Hatchery Returns	Total	Total Run	Wild %	Wild Impact
2002	4,223	329	106	4,658	1,864	683	2,351	6,832	11,730	16,388	28%	0.023
2003	5,837	457	94	6,388	3,576	1,048	1,603	6,171	12,398	18,785	34%	0.015
2004	4,799	129	145	5,072	4,253	743	3,076	4,752	12,824	17,896	28%	0.029
2005	2,586	171	43	2,800	562	489	661	3,199	4,911	7,711	36%	0.015
2006	2,225	164	3	2,392	945	470	49	3,026	4,490	6,882	35%	0.001

2006 Fisheries

The FMEP, implemented in 2001, calls for full mark-selective fisheries for hatchery spring Chinook. Beginning in 2002, only adipose fin-clipped spring Chinook were allowed to be retained in freshwater fisheries. All unmarked fish were required to be released unharmed. The goal of Willamette Basin fishery management for spring Chinook is to limit fishery impacts on wild fish to levels that ensure the survival and rebuilding of wild populations. An average annual impact rate of 15% or less in combined freshwater fisheries in the Willamette Basin and lower Columbia should achieve this goal. Fisheries in 2006, and expectations for 2007, are described in detail in ODFW/WDFW 2006.

Willamette spring Chinook fisheries in 2006 were managed successfully within the 15% impact rate limit. Table 12 provides 2006 catch estimates by fishery and fishery impact estimates on three populations of Willamette wild spring Chinook. Spring Chinook stock separations in Columbia River fisheries were made through visual stock identification and coded-wire-tag analyses (ODFW/WDFW 2005). The mortality rate for released fish in Columbia spring Chinook recreational fisheries is estimated to be 10%. Estimated commercial fishery release mortality rates in 2006 for spring Chinook were 40% in large-mesh gill nets (personal communication C. LeFleur, Chair, *U.S. v Oregon* Technical Advisory Committee). In the Willamette Basin, the lower Willamette and lower Clackamas recreational fisheries have been sampled for many years. Recreational fisheries above Willamette Falls were not sampled in 2005 or 2006, and estimated impacts to wild runs are derived from analysis of encounter rates of hatchery runs in upper river fisheries. The assumed mortality rate for released fish in Willamette Basin recreational fisheries is 12.2% (Lindsay et al. 2003). The fisheries impact on wild Willamette River spring Chinook in 2006 was 12.37% for the entire wild run. For specific populations, the impact was 12.22% for Clackamas, 12.42% for North Santiam, and 13.27% for McKenzie populations (Table 12).

Lower Columbia River Commercial Fishery

The 2006 lower Columbia spring Chinook commercial fishery was selective for adipose fin-clipped hatchery fish requiring all non-adipose-fin-clipped fish be released. This was the sixth year for a selective commercial fishery, although participation in 2001 was limited to 20 fishers. Since 2002, the fishery has been open to all licensed fishers who have completed mandatory

training on live-capture fishing techniques. The 2006 fishery was restricted to 8" minimum mesh, 45-minute maximum drift time, and mandatory use of recovery boxes to revive lethargic and bleeding fish. Large mesh was required in the February and early March portion of the fishery to limit steelhead interceptions while targeting Willamette hatchery spring Chinook. The fishery was managed for impacts to ESA-listed wild Willamette spring Chinook, listed spring Chinook destined for above Bonneville Dam, and listed steelhead. Additionally, agreements for allocation of Willamette hatchery spring Chinook between the recreational and commercial were in place (ODFW/WDFW 2006).

The 2006 commercial fishery was sampled by on-board monitors and at fish buying stations. The fishery was closed before allocations of hatchery spring Chinook were achieved because the ESA impact limit on upriver wild spring Chinook was met.

The fishery harvested 4,350 hatchery spring Chinook and released 2,300 non-adipose fin-clipped spring Chinook. The estimated Willamette spring Chinook proportions were 2,097 hatchery fish landed and 840 unclipped fish released. The estimated impact on Willamette wild spring Chinook is 318 fish, or 6.6% of the wild return to the Columbia River mouth.

Select Area Fisheries

Fisheries for net pen-reared spring Chinook occurred in 2006 in Youngs Bay, Blind Slough/Knappa Slough, and Deep River. The Tongue Point/South Channel fishery was closed because of a high interception rate of upriver spring Chinook in past seasons. Select Area fisheries were not restricted to adipose fin-clipped fish in 2006. These off-channel net pen and fishing sites are dominated by returns of local spring Chinook. A total of 6,769 spring Chinook were caught in 2006 SAFE fisheries including an incidental catch of 271 Willamette spring Chinook. The estimated impact on Willamette wild spring Chinook was 22 fish or 0.45% of the wild return. The proportion of non-localized fish landed in 2006 was similar to the long term average.

Lower Columbia Recreational Fishery

For the sixth consecutive year, the lower Columbia River recreational fishery was open for the majority of the spring to adipose fin-clipped hatchery spring Chinook, targeting an upriver spring Chinook return of 132,220 fish, and an overall spring Chinook return of all stocks of 215,270 fish. The fishing area included the area from the mouth upstream to McNary Dam. For many years the fishery was restricted to below the I-5 Bridge and closed April 1 or earlier to focus the fishery on lower river stocks of spring Chinook.

Table 12. 2006 Willamette spring Chinook freshwater catches and impacts on wild fish returns.

Fishery	Catch [1/] Kept	Released	Wild Fish Mortalities [2/]	Percentage Impact on Wild Return [3/]
Lower Columbia Commercial	2,097	840	318	6.58%
Select Area Commercial	271	0	22	0.45%
Lower Columbia Recreational	1,984	386	35	0.72%
Lower Willamette Recreational	7,027	1,648	203	4.20%
Total	11,379	2,874	578	11.96%
Clackamas Recreational	397	115	14	0.29%
Upper Willamette Recreational	571	NA	19	0.39%
North Santiam Recreational	487	NA	6	0.12%
McKenzie Recreational	902	NA	47	0.97%
Total			86	1.77%
Totals by Population				
Clackamas				11.80%
North Santiam				12.02%
McKenzie				12.87%

[1/] *Estimates from formal sampling programs. Fisheries denoted as NA were not sampled or estimates currently not available.*

[2/] *Estimated release mortality rates are 10% in the lower Columbia recreational fisheries and 12.2% in the lower Willamette and lower Clackamas recreational fisheries. Release mortalities for commercial fisheries vary by gear type used, and range from 18.5%-40%. The value used in 2006 was 40%.*

[3/] *Aggregate wild return estimated at 4,813 fish at the mouth of the Columbia River (8.1% of the actual 2006 Willamette spring Chinook run size of 59,662). Wild return to the Clackamas River estimated at 1,333 fish (12.7% of the 10,425 Clackamas return).*

Table 13. Freshwater fishery percent impact on wild Willamette River spring Chinook, 1981-2006.

	1981-1997	1998	1999	2000	2001[2/]	2002	2003	2004	2005	2006
Spring Chinook Fishery										
L. Col.Commercial [1/]	6.8	0.0	0.0	0.6	4.2	2.4	1.1	3.2	1.2	6.6
L. Col. Recreational	2.5	0.1	0.0	0.4	0.7	1.1	1.2	1.0	0.7	0.7
L. Willamette Recr.	21.7	6.3	10.2	14.0	2.1	3.0	2.4	2.7	3.2	4.2
Clackamas Recr.	22.9	26.5	22.8	13.6	1.5	4.9	0.8	0.3	0.5	0.3
U. Willamette Recr. [2/]	1.2	0.6	0.9	1.2	(0.3)	0.5	0.3	0.1	0.3	0.4
N. Santiam Recr. [2/]	16.5	22.7	21.7	2.0	(2.5)	0.4	0.1	0.1	0.1	0.1
McKenzie Recr. [2/]	5.1	0.0	0.0	0.0	(1.0)	1.4	0.9	1.2	0.6	1.0
Totals by Population										
Clackamas	54.0	22.8	33.0	28.2	8.5	11.3	5.4	7.2	5.7	11.8
North Santiam	48.8	29.6	32.8	18.0	9.78	7.2	5.0	7.1	5.6	12.0
McKenzie	37.3	7.0	11.1	16.1	8.3	8.3	5.8	8.2	6.1	12.9

[1/] *Includes mainstem salmon/sturgeon fisheries.*

[2/] *Rates for Upper Willamette, N. Santiam, and McKenzie for 2001 are assumed from Table 4 of the FMEP, ODFW 2001 page 28.*

The 2006 lower Columbia recreational fishery from Tongue Pt. to the I-5 Bridge was open seven days per week January 1-April 13, and May 17-June 15. The recreational fishery from above I-5 Bridge to Bonneville Dam was open seven days per week May 17-June 15. The fishery from Bonneville Dam upstream to McNary Dam was open from March 16-April 30 and from May 13-June 15. The total catch for the 2006 spring Chinook fishery below Bonneville Dam was 9,446 adult spring Chinook (6,985 kept and 2,461 released), 14 spring Chinook jacks, and 2,734 steelhead (2380 kept and 354 released) from 86,835 angler trips.

Of the 2006 kept catch of 6,985 hatchery spring Chinook from the Columbia mouth to I-5 Bridge, an estimated 1,984 adipose fin-clipped Willamette hatchery fish were retained, and 386 non-clipped Willamette fish were released. The estimated impact on Willamette wild spring Chinook was 35 fish or 0.7% of the wild return.

Lower Willamette Recreational Fishery

The 2006 lower Willamette recreational fishery was open seven days per week the entire year to adipose fin-clipped Chinook. This was the sixth year of full implementation of a selective spring Chinook fishery. Partial season selective fisheries occurred in 2000 and 2001.

ODFW Research and District staff conducted a study of the hooking mortality in the lower Willamette recreational fishery during 1998-2000 (Lindsay et al. 2003). Estimates of hooking mortality by anatomical hook locations were made from catch and release of recreational caught fish immediately below Willamette Falls and compared to uncaught fish in a control situation from a trap in the Willamette Falls fishway. Meanwhile, ODFW fish checkers in the lower Willamette recreational fishery were noting anatomical locations of hooking in landed catch. Applying the estimates of hooking mortality rates made at Willamette Falls to the distribution of

hook locations in the recreational fishery provides an estimated 12.2% catch and release hooking mortality in the lower Willamette river recreational fishery. The 12.2% rate has been used to estimate the fishery impact on released fish in the lower Willamette and Clackamas river recreational fisheries since 2002.

A total of 75,600 angler trips were made to catch 8,693 spring Chinook in 2006; 7,027 (81%) were kept adipose fin-clipped fish and 1,648 (19%) were released non-adipose-fin-clipped fish. The estimated impact on Willamette wild spring Chinook was 203 fish, or 4.2% of the wild return.

Clackamas River Recreational Fishery

The 2006 Clackamas River spring Chinook recreational fishery was open seven days per week the entire year for the fourth consecutive year and was restricted to adipose fin-clipped Chinook.

A total of 3,530 angler trips caught and retained 397 spring Chinook and released 115 non-adipose-fin-clipped fish. The estimated impact on Clackamas wild spring Chinook was 14 fish, or 0.3% of the wild return to the mouth of the Columbia River.

Upper Willamette Mainstem Recreational Fishery

The 2006 upper Willamette mainstem recreational fishery (from the Falls upstream to the mouth of the McKenzie River) was restricted to adipose fin-clipped Chinook the entire year. The recreational fishery in the upper Willamette is generally much smaller than the fishery in the lower Willamette, and was not sampled in 2005 or 2006. Estimates of impacts on Willamette wild spring Chinook in the upper Willamette were made using encounter rates of hatchery Chinook from derived from angler harvest cards. The estimated 2006 impact on upper Willamette wild spring Chinook was 19 fish, or 0.4% of the wild return to the mouth of the Columbia River.

Upper Willamette Tributary Recreational Fisheries

All tributary recreational fisheries in the Willamette Basin have been restricted to retention of adipose fin-clipped spring Chinook since 2002. Due to lack of funding, the upper Willamette tributary recreational fisheries were not monitored in 2006. Statistical catch estimates are not available as of this writing. Estimates of impacts on Willamette wild spring Chinook in the North Santiam and McKenzie rivers were made using encounter rates of hatchery Chinook from derived from angler harvest cards. The estimated 2006 impact on wild spring Chinook in the North Santiam and McKenzie rivers were 6 fish and 47 fish, respectively, or 0.1% and 1.0% of the wild return to the mouth of the Columbia River.

2006 Total Wild Fish Impacts

The estimated wild fish impact totals by population from the 2006 freshwater fisheries are 11.82%, 12.02 %, and 12.87% for the Clackamas, North Santiam, and McKenzie populations, respectively (Table 12). These estimates are below the 15% limits established in the FMEP. Fishery impact rates since 2001 have been much lower than the average rates of 37-54% during fisheries of 1981-1997 (Table 13).

2006 Angler Compliance With Regulations

Oregon State Police (OSP) Fish and Wildlife Division officers and their volunteers, with assistance from ODFW fish checkers, enforce Willamette spring Chinook angling regulations. A priority task is enforcement of the regulation requiring release of non-adipose-fin-clipped spring Chinook in recreational and commercial fisheries. Compliance with this regulation is relatively high (personal communication with Lt. Dave Cleary, OSP, Salem). Enforcement officers spent less hours than average in enforcing the 2006 recreational fishery, but spent a record high of 1,300 hours enforcing the 2006 commercial spring Chinook fishery, although compliance was relatively high in both fisheries.

Outlook for 2007 Willamette Spring Chinook Management

The 2007 Willamette spring Chinook run size forecast is for a total run of 52,000 fish, including 5,200 (10%) wild fish (Kern 2006; Figure 2). The forecast includes 1,600 age-3 fish, 7,500 (14.4%) age-4 fish, 42,500 (81.7%) age-5 fish, and 300 age-6 fish. In December 2001, the Oregon Fish and Wildlife Commission established a long-term allocation plan between the lower Columbia commercial fishery and the recreational fishery below Willamette Falls for sharing of the harvestable surplus of Willamette River hatchery spring Chinook. The shares for 2007, based on the forecast of 46,800 hatchery fish, are 16,560 hatchery fish to the recreational fishery and 4,140 hatchery fish to the commercial fishery (Table 14). Due to impact rates limits of 1.5% to upriver spring Chinook stocks in 2007, it is possible that neither fishery will achieve their allocation in 2007.

All freshwater Willamette spring Chinook fisheries will continue to be selective to adipose fin-clipped fish in 2007. All Willamette Basin recreational fisheries are restricted to adipose fin-clipped fish under permanent rule, and regulations are printed as such in the *2007 Oregon Sport Fishing Regulations* pamphlet.

The lower Columbia spring Chinook recreational fishery is currently open under permanent regulations through March 31 below the I-5 Bridge. The fishery will be managed primarily on impacts to listed upriver spring Chinook. ODFW and WDFW fishery managers will meet in the Joint State Recreational Fishery Forum immediately following the Columbia River Compact hearing January 25, 2007 to establish the fishery. Based on preseason modeling, the fishery will likely be extended through mid-April and could possibly reopen after a run update in early May if impacts to upriver spring Chinook remain available.

The Columbia River commercial fishery will be set at the January 25 or subsequent Columbia River Compact hearings. The 2007 commercial fishery may include a mix of large-mesh gillnets to target age-5 Willamette spring Chinook and limit steelhead handling, and 4¼" mesh tangle nets. The commercial fishery will be required to use shortened nets with 45-minute maximum drift times. All lethargic or bleeding non-adipose-fin-clipped spring Chinook will be placed in on-board recovery boxes to be revived prior to release. ODFW and WDFW will monitor the fishery to estimate the effectiveness of fishing gear and catch of target and non-target fish. This fishery will be managed primarily on impacts to listed upriver spring Chinook and lower river winter steelhead.

The 2007 cumulative freshwater fishery impact on Willamette wild spring Chinook is expected to be below the average annual impact rate of 15% specified in the FMEP.

Chris Kern
ODFW
January, 2007
Revised July, 2007 (updated fishery data)

Table 14. Willamette spring Chinook allocation schedule.

Predicted Willamette Hatchery Run Size	Hatchery Fish Escapement Targets			Number of Hatchery Fish Available	Harvest Shares Below the Falls			
	Willamette Falls Escapement Target	Clackamas Escapement Target	Combined Escapement Target		Recreational		Commercial	
					Share	Catch	Share	Catch
23,000	20,000	3,000	23,000	0	<1%	<230	<1%	<230
24,000	20,000	3,000	23,000	1,000	100%	1,000	<1%	<240
25,000	20,000	3,000	23,000	2,000	100%	2,000	<1%	<250
26,000	20,000	3,000	23,000	3,000	100%	3,000	<1%	<260
27,000	20,000	3,000	23,000	4,000	100%	4,000	<1%	<270
28,000	20,000	3,000	23,000	5,000	100%	5,000	<1%	<280
29,000	20,000	3,000	23,000	6,000	100%	6,000	<1%	<290
30,000	20,000	3,000	23,000	7,000	100%	7,000	<1%	<300
31,000	20,000	3,000	23,000	8,000	100%	8,000	<1%	<310
32,000	20,000	3,000	23,000	9,000	100%	9,000	<1%	<320
33,000	20,000	3,000	23,000	10,000	100%	10,000	<1%	<330
34,000	20,000	3,000	23,000	11,000	100%	11,000	<1%	<340
35,000	20,000	3,000	23,000	12,000	100%	12,000	<1%	<350
36,000	20,000	3,000	23,000	13,000	100%	13,000	<1%	<360
37,000	20,000	3,000	23,000	14,000	100%	14,000	<1%	<370
38,000	20,000	3,000	23,000	15,000	100%	15,000	<1%	<380
39,000	20,000	3,000	23,000	16,000	100%	16,000	<1%	<390
40,000	22,000	3,300	25,300	14,700	85%	12,495	15%	2,205
41,000	22,000	3,300	25,300	15,700	85%	13,345	15%	2,355
42,000	22,000	3,300	25,300	16,700	85%	14,195	15%	2,505
43,000	22,000	3,300	25,300	17,700	85%	15,045	15%	2,655
44,000	22,000	3,300	25,300	18,700	85%	15,895	15%	2,805
45,000	22,000	3,300	25,300	19,700	80%	15,760	20%	3,940
46,000	22,000	3,300	25,300	20,700	80%	16,560	20%	4,140
47,000	22,000	3,300	25,300	21,700	80%	17,360	20%	4,340
48,000	22,000	3,300	25,300	22,700	80%	18,160	20%	4,540
49,000	22,000	3,300	25,300	23,700	80%	18,960	20%	4,740
50,000	24,000	3,600	27,600	22,400	76%	17,024	24%	5,376
51,000	24,000	3,600	27,600	23,400	76%	17,784	24%	5,616
52,000	24,000	3,600	27,600	24,400	76%	18,544	24%	5,856
53,000	24,000	3,600	27,600	25,400	76%	19,304	24%	6,096
54,000	24,000	3,600	27,600	26,400	76%	20,064	24%	6,336
55,000	24,000	3,600	27,600	27,400	76%	20,824	24%	6,576
56,000	24,000	3,600	27,600	28,400	76%	21,584	24%	6,816
57,000	24,000	3,600	27,600	29,400	76%	22,344	24%	7,056
58,000	24,000	3,600	27,600	30,400	76%	23,104	24%	7,296
59,000	24,000	3,600	27,600	31,400	76%	23,864	24%	7,536
60,000	26,500	4,000	30,500	29,500	73%	21,535	27%	7,965
61,000	26,500	4,000	30,500	30,500	73%	22,265	27%	8,235
62,000	26,500	4,000	30,500	31,500	73%	22,995	27%	8,505
63,000	26,500	4,000	30,500	32,500	73%	23,725	27%	8,775
64,000	26,500	4,000	30,500	33,500	73%	24,455	27%	9,045
65,000	26,500	4,000	30,500	34,500	73%	25,185	27%	9,315
66,000	26,500	4,000	30,500	35,500	73%	25,915	27%	9,585
67,000	26,500	4,000	30,500	36,500	73%	26,645	27%	9,855
68,000	26,500	4,000	30,500	37,500	73%	27,375	27%	10,125
69,000	26,500	4,000	30,500	38,500	73%	28,105	27%	10,395

Table 14 Continued, Next Page

Table 14. continued.

Predicted Willamette Hatchery Run Size	Hatchery Fish Escapement Targets			Number of Hatchery Fish Available	Harvest Shares Below the Falls			
	Willamette Falls Escapement Target	Clackamas Escapement Target	Combined Escapement Target		Recreational		Commercial	
					Share	Catch	Share	Catch
70,000	29,000	4,400	33,400	36,600	73%	26,718	27%	9,882
71,000	29,000	4,400	33,400	37,600	73%	27,448	27%	10,152
72,000	29,000	4,400	33,400	38,600	73%	28,178	27%	10,422
73,000	29,000	4,400	33,400	39,600	73%	28,908	27%	10,692
74,000	29,000	4,400	33,400	40,600	73%	29,638	27%	10,962
75,000	29,000	4,400	33,400	41,600	73%	30,368	27%	11,232
76,000	29,000	4,400	33,400	42,600	70%	29,820	30%	12,780
77,000	29,000	4,400	33,400	43,600	70%	30,520	30%	13,080
78,000	29,000	4,400	33,400	44,600	70%	31,220	30%	13,380
79,000	29,000	4,400	33,400	45,600	70%	31,920	30%	13,680
80,000	32,000	4,900	36,900	43,100	70%	30,170	30%	12,930
81,000	32,000	4,900	36,900	44,100	70%	30,870	30%	13,230
82,000	32,000	4,900	36,900	45,100	70%	31,570	30%	13,530
83,000	32,000	4,900	36,900	46,100	70%	32,270	30%	13,830
84,000	32,000	4,900	36,900	47,100	70%	32,970	30%	14,130
85,000	32,000	4,900	36,900	48,100	70%	33,670	30%	14,430
86,000	32,000	4,900	36,900	49,100	70%	34,370	30%	14,730
87,000	32,000	4,900	36,900	50,100	70%	35,070	30%	15,030
88,000	32,000	4,900	36,900	51,100	70%	35,770	30%	15,330
89,000	32,000	4,900	36,900	52,100	70%	36,470	30%	15,630
90,000	35,000	5,400	40,400	49,600	70%	34,720	30%	14,880
91,000	35,000	5,400	40,400	50,600	70%	35,420	30%	15,180
92,000	35,000	5,400	40,400	51,600	70%	36,120	30%	15,480
93,000	35,000	5,400	40,400	52,600	70%	36,820	30%	15,780
94,000	35,000	5,400	40,400	53,600	70%	37,520	30%	16,080
95,000	35,000	5,400	40,400	54,600	70%	38,220	30%	16,380
96,000	35,000	5,400	40,400	55,600	70%	38,920	30%	16,680
97,000	35,000	5,400	40,400	56,600	70%	39,620	30%	16,980
98,000	35,000	5,400	40,400	57,600	70%	40,320	30%	17,280
99,000	35,000	5,400	40,400	58,600	70%	41,020	30%	17,580
100,000	39,000	6,000	45,000	55,000	70%	38,500	30%	16,500
101,000	39,000	6,000	45,000	56,000	70%	39,200	30%	16,800
102,000	39,000	6,000	45,000	57,000	70%	39,900	30%	17,100
103,000	39,000	6,000	45,000	58,000	70%	40,600	30%	17,400
104,000	39,000	6,000	45,000	59,000	70%	41,300	30%	17,700
105,000	39,000	6,000	45,000	60,000	70%	42,000	30%	18,000
106,000	39,000	6,000	45,000	61,000	70%	42,700	30%	18,300
107,000	39,000	6,000	45,000	62,000	70%	43,400	30%	18,600
108,000	39,000	6,000	45,000	63,000	70%	44,100	30%	18,900
109,000	39,000	6,000	45,000	64,000	70%	44,800	30%	19,200
110,000	39,000	6,000	45,000	65,000	70%	45,500	30%	19,500

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